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PREPARATIONS FOR THE UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT ON THE BASIS OF GENERAL ASSEMBLY RESOLUTION 44/228 AND TAKING INTO ACCOUNT OTHER RELEVANT GENERAL ASSEMBLY RESOLUTIONS:

[PROTECTION OF THE QUALITY AND SUPPLY OF FRESHWATER RESOURCES: APPLICATION OF INTEGRATED APPROACHES TO THE DEVELOPMENT, MANAGEMENT AND USE OF WATER RESOURCES

Options for agenda 21

As revised during the informal consultations at the third session of the Preparatory Committee

Report of the Secretary-General of the Conference

I. INTRODUCTION

1. Effectively integrated management of water resources is important to all socio-economic sectors relying on water. Rational allocation prevents conflict and enhances the social development of local communities as well as economic planning and productivity. Efficient demand management allows water-using sectors to make long-term savings on water costs and stimulates resource-conscious production technologies. Health conditions and environmental quality should also improve either resulting from integrated development planning or as a beneficial consequence of improved environmental or social conditions.

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Linkages to other Environmental and Developmental Issues

2. Water is a finite resource, essential for the sustenance of life on earth. Virtually all the environmental issues listed in the United Nations General Assembly resolution 44/228 are directly or indirectly linked to freshwater issues. With increases in economic activities and the consequent potential for stress on ecosystems and natural resource stocks, the study and recognition of linkages between freshwater issues and other sectoral and cross-sectoral issues is becoming increasingly important. Socio-economic pursuit (including urbanization, industrial production and agricultural activities) has reached a stage where freshwater issues have often become the limiting factor for sustainable development. Freshwaters (rivers, reservoirs, lakes and groundwaters [, polar ice mass and glaciers]) are in contact with other ecosystems and are used in a variety of human activities, many of which would not be possible without a freshwater supply of adequate quality and quantity.

3. Poor land-use management, including deforestation, non-sustainable agriculture, mining and urbanization, could lead to a considerable increase in erosion problems and related soil loss in the river basins. The sedimentation in large reservoirs may have serious adverse effects downstream by reducing the quantity of natural nutrients available to agricultural land or to coastal waters. The loss of nutrients can lead to increased fertilizer use and decreases in coastal fishery yields. Acidification of surface and some groundwaters due to atmospheric deposition of air pollutants can lead to depletion of freshwater living resources, contributing to the loss of biodiversity. Construction of dams for hydropower and irrigation, water channelization, over-abstraction from aquifers, use of water bodies as open sewers for discharge of both domestic and industrial wastes can lead to salinization of rivers, lakes, and soils, salt intrusions in coastal aquifers, and serious water pollution problems. Should global warming occur as a result of climate change it would affect low-lying island freshwater resources and may affect the world's freshwater resources through [the melting of ice mass in the Arctic and Antarctic regions and] changes in the hydrologic cycle, resulting in changes in precipitation, with possible decreases in many areas of the Northern Hemisphere, accompanying decreases in soil moisture and annual river runoff. Even in the absence of global warming, natural variation in precipitation may be expected as in the past, resulting in periodic drought which can impact water availability, with consequent negative implications for economy and development. Because of these concerns, an integrated approach to freshwater management seems vital along with, for example, an integrated approach to pollution control, the optimal use of water and a holistic approach to the conservation of ecosystems.

4. [The existence of transboundary waters and their use is of significant importance to the riparian States concerned. In these circumstances it may well be necessary for the concerned States to negotiate appropriate multilateral or bilateral agreements as relevant to ensure that riparian rights and practices should take into account the mutual interests of the parties concerned.]

5. Water-related diseases are still a major health problem, especially in the developing countries. Diseases caused by microbiological pollution of water supplies or transmitted by water-associated vectors, and those related to inadequate sanitation and absence of clean water, are widespread. With water use per capita expected to increase significantly in developing countries with high economic or population growth rates, the volume of waste requiring treatment is expected to present a growing problem. Likewise, the application of water-intensive production techniques and other high water-use consumption patterns are of concern in certain countries, particularly industrial ones. To ignore the interactions and linkages between freshwater issues and other sectoral issues could result in severe social, economic or human health consequences. Therefore, the provision of water supply and sanitation in developing countries is not only a vital ingredient of economic and social development but also an important element of environmental protection.

II. GENERAL OBJECTIVES OF AGENDA 21

6. Water is a necessity of all life. The overall objective is to maintain the hydrological, biological and chemical functions of ecosystems to adapt human activities to the limits of nature's carrying capacity and to control water-related disease vectors.

7. Freshwater resources are an essential component of the earth's hydrosphere and an indispensable part of all terrestrial ecosystems. The freshwater environment is characterized by its hydrological regime including floods and droughts which, in some regions, have become more extreme and dramatic in their consequences in recent years. Global climate changes could also have their impact on freshwater resources and their availability and, through sea level rise, threaten coastal aquifers and small island ecosystems.

8. Freshwaters are a finite resource, not only indispensable for the sustenance of life on earth but also of vital importance to all socio-economic sectors. Development is not possible without considerable exploitation of water sources in relation to other land use activities and the control of deforestation and desertification. Priority must be given to the sustenance of land/water ecosystems, with particular attention to wetlands and biodiversity, and the satisfaction of basic human needs for drinking water, health protection and food security. For any water utilization beyond this, freshwater resources have to be considered as an economic good with an opportunity cost in alternative uses.

9. The Mar del Plata Action Plan, which emerged from the United Nations Water Conference in 1977, remains generally valid as the common basis for national and international action programmes in the freshwater sector. The review of progress achieved in its implementation and resulting strategies for the 1990s are reflected in Economic and Social Council resolution 1991/... . Agenda 21 in this sector, as presented hereunder, is based on these strategies, on the results of the Global Consultation on Safe Water and Sanitation for the 1990s, held at New Delhi in September 1990 (General Assembly resolution 45/181) and on the recommendations which may emerge from the International Conference on Water and the Environment in Dublin, January 1992, and on the results of the Preparatory Committee.

10. The widespread scarcity of freshwater resources, the progressive encroachment of incompatible activities and the gradual destruction of freshwater resources and their aggravating pollution in many world regions demands truly integrated water resources planing and management. The multisectoral nature of water resources development in the context on socio-economic development must be recognized as well as the multi-interest utilization of water resources for agriculture, industry, urban development, hydropower, inland fisheries, transportation, recreation and other activities. Rational water utilization schemes for the development of surface and underground water supply sources and other potential sources have to be supported by concurrent water conservation and wastage minimization measures.

11. Integrated water resources management necessitates appropriate mechanisms at the global, regional, national and local levels for implementing, coordinating and funding the related strategies and action programmes. Management of water resources should, as far as possible, take place in a river basin context (catchment level). [The options proposed by the International Conference on Water and the Environment - Development Issues for the Twenty-First Century, held in Dublin, January 1992, has provided an input to identifying suitable implementation mechanisms.]

12. Capacity building is a prerequisite to integrated water resources management. Technical solutions will not achieve programme objectives on their own without suitable attention given to the human factor. The Symposium on a Strategy for Water Resources Capacity Building, held in Delft, June 1991, recognized the importance of capacity building for integrated and sustainable development of water resources at all levels. Capacity building consists of four basic elements:

- creating an enabling environment with appropriate policy and legal frameworks;

- institutional strengthening and development, including local community participation;

- human resources development, including the strengthening of managerial systems and water users interests;

- awareness building and education at all levels of society, [including inter alia, the consideration of a United Nations World Water Day].

13. [Adequate new and additional financial resources are indispensable for the effective utilization and protection of freshwater resources. Pursuant with the recognition of water as an economic good, but with priority to the satisfaction of basic needs, internal revenues have to be generated through cost recovery schemes, water tariffs, taxes, etc. for uses implying productive activities, reflecting marginal and opportunity costs. In addition, external support will be required for water resources development from multilateral or bilateral sources (External Support Agencies) and from the private sector.]

14. Innovative technologies, including the improvement of indigenous techniques, are much needed to fully utilize limited water resources and to safeguard them against pollution. Implementation of Agenda 21 in the water sectors must therefore be supported by broad-based research and development programmes allowing for new technological solutions to be developed and field-tested. Technology [transfer on preferential and concessional terms] and [cooperation and diffusion] on all aspects of integrated water resources management is to be built into each programme area.

III. PROGRAMME AREAS OF AGENDA 21

15. In accordance with the general objectives, the following components were developed for the freshwater sector:

(a) Integrated Water Resources Development and Management;

(b) Water Resources Assessment;

(c) Protection of Water Resources, Water Quality and Aquatic Ecosystems;

(d) Drinking Water Supply and Sanitation;

(e) Water and Sustainable Urban Development;

(f) Water for Sustainable Food Production and Rural Development;

(g) [Impacts of Climate Change on Water Resources].

16. Each component is presented in this document in a format which covers the basis for action, objectives, activities [and means of implementation which will include, inter alia, the issues of financing and cost evaluation, scientific and technological means, human resources development and building capacity of developing countries for preventive and corrective action in the field of environmental protection and promotion of development].

A. INTEGRATED WATER RESOURCES DEVELOPMENT AND MANAGEMENT

Basis for action

17. The extent to which water resources development contributes to economic productivity and social well-being is not usually appreciated although all social and economic activities rely heavily on the supply and quality of fresh water. As populations and economic activities grow many countries are rapidly reaching conditions of water scarcity or face limits to economic development. Water demands are increasing rapidly, with 70-80 per cent for irrigation, less than 20 per cent for industry and a mere 6 per cent for domestic consumption. The holistic management of water as a finite and vulnerable resource, and the integration of sectoral water plans and programmes within the framework of national economic and social policy is of paramount importance for action in the 1990s and beyond. The fragmentation of responsibilities for water resources development among sectoral agencies is proving, however, to be an

even greater impediment to promoting integrated water management than had been anticipated. Effective implementation and coordination mechanisms are required not only at the national level but also at the inter-country and international levels.

Objectives

18. The overall objective is to satisfy the freshwater needs of countries for their economic and social development.

19. Integrated water resources management is based on water as an integral part of the ecosystem, a natural resource and an economic good, the quantity and quality of which determines its utilization. To this end, the availability and quality of water resources have to be protected, taking into account the functioning of aquatic ecosystems and the perennity of the resource in order to satisfy or reconcile water needs for human activities. In developing and using water resources, priority has to be given to the satisfaction of basic needs and the safeguarding of ecosystems. Beyond these requirements, however, water users should be charged its true marginal costs.

20. Integrated water resources management should be carried out at the catchment basin or sub-basin level, taking into account existing interlinkages between surface and groundwaters. Four principal goals should be pursued as follows:

a. to promote a dynamic, interactive, iterative and multisectoral approach to water resources management, including the identification and protection of potential sources of freshwater supply, which integrates technological, socio-economic, environmental and human health considerations;

b. to plan the rational utilization, protection, conservation and management of water resources based on community needs and priorities and within the framework of national economic development policy;

c. to design, implement and evaluate projects and programmes which are both economically efficient and socially appropriate within clearly defined strategies, based on a full public participatory approach, including the participation of women and indigenous peoples in water management policy-making and decision-making at the community level as well as at the national, regional and global levels;

d. to identify and strengthen or develop, as required, in particular in developing countries, the appropriate institutional, legal and financial mechanisms to ensure that water policy and its implementation is a catalyst for sustainable social progress and economic growth.

21. The strengthening of national capacities to manage the resource and the role of government and local organizations in creating the enabling environment for efficient and equitable utilization of the resource are crucial. In the case of transboundary water resources there is an even greater need to formulate and harmonize water resources strategies and action programmes.

22. [Although difficult to measure success in this area, quantitative targets could realistically be set as follows:

By the year 2000:

a. all countries, in accordance with their capacities and resources available, will have designed and initiated costed and targeted national action programmes, and 75 per cent of all countries will have appropriate institutional structures and legal instruments in place.

By the year 2025:

b. subsectoral targets of all freshwater programme areas will be reached.

It is understood that the fulfilment of the targets quantified in (a) and (b) above will depend upon new and additional financial resources that will be made available to developing countries in accordance with the relevant provisions of General Assembly resolution 44/228.]

Activities

23. [Countries, especially developing countries, according to their possibilities and with the assistance of relevant United Nations bodies and international donors, could implement the following activities to improve integrated water resources management in their countries:]

a. formulation of costed and targeted national action plans and investment programmes;

b. integration of measures for the protection and conservation of potential sources of freshwater supply, including the inventorization of water resources, with land-use planning, forest resource utilization and other relevant development activities;

c. development of interactive databases, forecasting methods and economic planning models;

d. optimization of water resources allocation under physical and socio-economic constraints;

e. implementation of allocation decisions through demand management, pricing mechanisms and regulatory measures;

f. flood and drought management using risk analysis and environmental and social impact assessment;

g. promotion of schemes for rational water use through public awareness raising, educational programmes, levying of water tariffs and other economic instruments;

h. mobilization of water resources, particularly in arid and semi-arid areas;

i. promotion of international scientific research cooperation on freshwater resources;

j. development of new and alternative sources of water supply such as seawater desalination, artificial groundwater recharge, use of marginal-quality water, waste water reuse and water recycling;

k. integration of water quantity and quality management, including surface and underground water resources;

l. promotion of water conservation and wastage minimization schemes for all users, including the development of water-saving devices;

m. support to water users groups to optimize local water resources management;

n. development of public participatory techniques and their implementation in decision making, particularly the enhancement of the role of women in water resources planning and management;

o. development and strengthening, as appropriate, of implementation mechanisms at all levels concerned:

- at the global level improved delineation of responsibilities, division of labour and coordination of international organizations and programmes;

[- at the regional level watershed-based organizations (river or lake basin authorities) and legal agreements for the joint management of transboundary water bodies;]

- at the national level integrated water resources planning and management in the framework of the national planning process, and where appropriate, establishment of independent regulation and monitoring of freshwater, based on national legislation and economic measures;

- at the [local/decentralized] level delegation of water resources management to the lowest appropriate level, including decentralization of government services to local authorities, private enterprises and communities;

[p. elaboration, dissemination and application of operational guidelines in support of the implementation of national action plans and local water management schemes];

[q. capacity building, including the rationalization and strengthening of institutional and legal structures and the development of the necessary human resources basis.]

Means of implementation

24. [The implementation by developing countries of specific programmes and actions envisaged under Agenda 21 will be subject to the provision of adequate new and additional financial resources and of technology on concessional, preferential and non-commercial terms.

Proposals for means of implementation will include the following headings:

- Financing and cost evaluation;
- Scientific and technological means;
- Human resources development;
- Building capacity of developing countries for preventive and corrective action in the field of environmental protection and promotion of development.]

B. WATER RESOURCES ASSESSMENT

Basis for action

25. Water resources assessment, including the identification of potential sources of freshwater supply, is the continuing determination of sources, extent, dependability, and quality of water resources. It is the practical basis for their sustainable management and a prerequisite for evaluation of the possibilities for this development. There is, however, growing concern that at a time when more precise and reliable information is needed about water resources, hydrological services and related bodies are less able to provide this information, especially information on groundwater and water quality. Major impediments are: the lack of financial resources for WRA, the fragmented nature of hydrological services and the insufficient numbers of qualified staff. At the same time the advancing technology for data capture and management is increasingly difficult to access for developing countries. Establishment of national data bases is, however, vital to WRA and for mitigating the effects of floods, droughts, desertification and pollution.

Objectives

26. Based upon the Mar del Plata Action Plan, this programme area is extended into the 1990s and beyond with the overall objective to ensure the assessment and forecasting of the quantity and quality of water resources, in order to estimate the total quantity of water resources available and their future supply potential, to reflect their current quality status, to predict possible conflicts between supply and demand and to provide a scientific data base for rational water resource utilization.

27. Five specific objectives are set accordingly as follows:

a. to make available to all countries water resource assessment technology which is appropriate to their needs, irrespective of their level of development, including methods for the impact assessment of climate change on freshwaters;

b. to have all countries, according to their financial means, allocate to water resource assessment financial resources in line with the economic and social needs for water resources data;

c. to ensure that the assessment information is fully utilized in the development of water management policies;

d. to have all countries establish the institutional arrangements needed to ensure the efficient collection, processing, storage, retrieval and dissemination to users of information about the quality and quantity of available water resources in an integrated manner;

e. to have sufficient numbers of appropriately qualified and capable staff recruited and retained by water resource assessment agencies, and provided with the training and retraining they need to carry out their responsibilities successfully.

28. [Quantitative programme targets can be set for the number of countries covered with adequate services:

a. by the year 2000 all countries, appropriate to their individual capacities and available resources, should have studied in detail the feasibility of installing water resources assessment services;

b. by the year 2000 there should be water resources assessment services with a high-density hydrometric network installed in 70 countries, and services with limited but adequate capacity in 60 countries;

c. by the year 2025 there should be 110 countries with fully developed services, and 40 countries with services of a limited capacity;

d. the longer-term target is to have fully operational services, based upon high-density hydrometric networks, available in all countries, appropriate to their individual capacities and available resources.]

<u>Activities</u>

Note: a new section on "Activities" to be prepared and the present text on activities to be incorporated in "Means of Implementation".

29. [Countries, especially developing countries, according to their possibilities and with the assistance of relevant United Nations agencies, regional and international organizations and donor agencies, and through bilateral and multilateral agreements, could undertake the following activities:

a. increasing financial resources

- securing augmented budgetary allocations

- exploring novel ways of funding

- estimating the ecological, economic and social value of water resources data.

b. improving institutional arrangements

- facilitating close collaboration between water sector agencies, particularly between information producers and users

- reviewing the legislative and regulatory basis of WRA

- preparing catalogues of the water resources information held by government services, private sector, educational institutes, consultants, local water use organizations and others

- implementing water management policies based upon realistic appraisals of water resource conditions and trends.

c. upgrading and increasing technology transfer

- encouraging international organizations and donors to meet initially the immediate needs of the country commensurate with their technological standards

- developing strategies for meeting requirements over the medium and long term.

d. capacity building for WRA

- encouraging the provision of attractive terms of employment and career paths for professional and technical staff

- monitoring human resources needs and meeting them through education and training opportunities, and international programmes of courses and conferences

- strengthening the managerial capabilities of water users groups to improve water use efficiency at the local level.]

Means of Implementation

30. [The implementation by developing countries of specific programmes and actions envisaged under Agenda 21 will be subject to the provision of adequate new and additional financial resources and of technology on concessional, preferential and non-commercial terms.

Proposals for means of implementation will include the following headings:

- Financing and cost evaluation

- Scientific and technological means

- Human resources development

- Building capacity of developing countries for preventive and corrective action in the field of environmental protection and promotion of development.]

C. PROTECTION OF WATER RESOURCES, WATER QUALITY AND AQUATIC ECOSYSTEMS

Basis for action

31. There are few regions of the world that are still exempt from problems of loss of potential sources of freshwater supply and of degraded water quality and the pollution of surface and groundwater sources. Major problems affecting the water quality of rivers and lakes arise from inadequately treated domestic sewage, inadequate controls on the discharges of industrial waste waters, the loss and destruction of catchment areas, siting of industrial plants, deforestation, uncontrolled shifting cultivation and poor agricultural practices, giving rise to the leaching of nutrients and pesticides. Aquatic ecosystems are disturbed and the living freshwater resources are threatened. Aquatic ecosystems are also affected by agricultural water resource development projects such as dams, river diversions, water installations and irrigation schemes. Erosion, sedimentation, deforestation and desertification have led to increased land degradation, and the creation of reservoirs has, in some cases, resulted in adverse effects on the food chain. Many of these problems have arisen from a development model which is environmentally destructive and from a lack of public awareness and education about surface and groundwater resource protection. Ecological and human health effects are the measurable consequences, although the means to monitor them are grossly inadequate or non-existent in many developing countries.

Objectives

32. Already the Mar del Plata Action Plan recognized the intrinsic linkage between water resource development projects and their important repercussions of a physical, chemical, biological, health and socio-economic nature. The overall environmental health objective was set:

> "to evaluate the consequences which the various users of water have on the environment, to support measures aimed at controlling water-related diseases, and to protect ecosystems".

33. Three objectives will have to be pursued concurrently to integrate water quality aspects into water resource management:

a. maintenance of ecosystem integrity - a management principle to preserve aquatic ecosystems, including the living resources, and to protect them effectively from any form of degradation;

b. public health protection - a task requiring not only the provision of pathogen-free drinking water but also the control of disease vectors in the aquatic environment;

c. human resources development - a key to capacity building and a prerequisite for implementing water quality management.

34. [The following targets have been set to integrate water quality aspects into water resource management:

a. by the year 2000 all countries, appropriate to their capacities and resources available, should have identified all potential sources of water supply and prepared outlines for their protection, conservation and rational use;

b. by the year 2000 all countries should have effective water pollution control programmes, defined as enforceable standards for major point-source discharges and high-risk non-point sources, commensurate with their socio-economic development;

c. by the year 2000 all countries should participate, as far as appropriate, in intercountry and international water quality monitoring and management programmes such as the Global Water Quality Monitoring Programme GEMS/WATER, UNEP's Environmentally Sound Management of Inland Waters, FAO's regional inland fishery bodies, and the RAMSAR Convention on Wetlands of International Importance especially as Waterfowl Habitat;

d. by the year 2025 the prevalence of water-associated diseases should be drastically reduced, starting with the eradication of dracunculosis (Guinea worm) by the year 2000 and onchocerciasis (river blindness) by the year 2000.

e. by the year 2025 all countries should have established biological, health, physical and chemical quality criteria for all water bodies (surface and groundwater) with a view to an ongoing improvement of water quality.]

Note: activities for target (d) are included in part under section D and in the Agenda 21 chapter on human health aspects [PC/54].

Activities

35. [All countries, especially developing countries, according to their possibilities and with the assistance of appropriate United Nations agencies and other international organizations, regional economic cooperation organizations, and in cooperation with the industrialised countries could embark upon the following activities:]

a. Water resources protection and conservation

- establishment and strengthening of technical and institutional capacities to identify and protect potential sources of water supply
- promotion and extension of the application of GIS and EIA
- identification of potential sources of water supply and preparation of national inventories
- preparation of national plans for water resources protection and conservation
- strengthening of administrative and legislative measures to prevent encroachment into potentially usable catchment areas.

b. water pollution prevention and control

- application of the polluter pays principle to all kinds of sources, including on-site and off-site sanitation
- promotion of the construction of treatment facilities for domestic sewage, drainage waters, industrial effluents, and the development of appropriate and indigenous technologies
- establishment of standards for the discharge of effluents and for the receiving waters
- introduction of the precautionary approach in water quality management
- mandatory environmental impact assessment on all water resource development projects potentially impairing water quality and aquatic ecosystems, combined with a strengthened control of new industrial installations, solid waste landfills and infrastructure development projects
- enforcement of decisions based on risk assessment and risk management
- identification and application of best environmental practices to avoid diffuse pollution, i.e. through a limited, rational and planned use of nitrogenous fertilizers and other agrochemicals (pesticides, herbicides) in agricultural practices
- encouragement and promotion of adequately treated and purified wastewaters in agriculture, aquaculture, industry and other sectors.

c. development and application of clean technology

- control of industrial waste discharges, including low-waste production technologies and water recirculation

- treatment of municipal wastewater for safe reuse in agriculture and aquaculture

- development of biotechnology for waste treatment, production of biofertilizers etc.

- development of appropriate and indigenous methods for water pollution control.

d. groundwater protection

- application of the necessary measures to mitigate saline intrusion into aquifers of small islands and coastal plains as a consequence of sea-level rise or of overexploitation of coastal aquifers

- prevention of aquifer pollution through the establishment of protection zones in groundwater recharge and abstraction areas

- design and management of landfills based upon sound hydrogeological information and impact assessment, using best available technology

- mandatory water quality monitoring, on a permanent basis, of surface and groundwaters potentially affected by landfills.

e. protection of aquatic ecosystems

- rehabilitation of polluted and degraded water bodies to restore aquatic habitats and ecosystems

- rehabilitation programmes for agricultural lands and for other users, taking into account equivalent action for the preservation and use of groundwater resources, important for agricultural productivity and for the biodiversity of the tropics

- conservation, in a balanced ecological and socio-economic framework, and protection of wetlands due to their ecological and habitat importance for many species as well as their socio-economic values

- control of noxious aquatic species which may destroy some other water species.

f. protection of freshwater living resources

- control and monitoring of water quality to allow for the sustainable development of inland fisheries

- protection of ecosystems from pollution for the development of freshwater aquaculture projects.

g. monitoring and continuous surveillance of waters receiving wastes and water resources

- establishment of networks for the monitoring and continuous surveillance of waters receiving wastes and of point and diffuse sources of pollution

- surveillance of all pollution sources to improve the compliance with standards and regulations and to regulate the issue of discharge permits

- monitoring of the utilization of chemicals in agriculture

- rational land use to prevent land degradation, erosion and siltation of lakes and other water bodies.

h. development of national and international legal instruments for water quality protection

The protection of the quality of water resources requires legal instruments, particularly for:

- monitoring and control of pollution in national and transboundary waters

- control of long-range atmospheric transport of pollutants

- control of accidental and/or deliberate spills in national and/or transboundary water bodies

- environmental impact assessment.

i. [capacity building for water quality management

- establishment and strengthening of institutional frameworks at national and local levels

- development of technical infrastructure for water quality monitoring, assessment and control to include capacity for standard setting, permits and effective enforcement at the national and local level

- training of professionals to enhance staff capabilities at technical and managerial levels

- dissemination of information to water users at all levels on, inter alia, ecosystems, the water cycle, water quality protection, source control measures and water-borne disease control

- awareness building on ecological and water quality issues at all levels.]

Means of Implementation

36. [The implementation by developing countries of specific programmes and actions envisaged under Agenda 21 will be subject to the provision of adequate new and additional financial resources and of technology on concessional, preferential and non-commercial terms.

Proposals for means of implementation will include the following headings:

- Financing and cost evaluation
- Scientific and technological means
- Human resources development
- Building capacity of developing countries for preventive and corrective action in the field of environmental protection and promotion of development.]

D. DRINKING WATER SUPPLY AND SANITATION

Basis for action

37. Safe water supplies and environmental sanitation are vital for protecting the environment, improving health and alleviating poverty. An estimated 80 per cent of all diseases and over one third of deaths in developing countries are caused through the consumption of contaminated water and on average as much as one tenth of each person's productive time is sacrificed to water-related diseases. Concerted efforts during the 1980s brought water and sanitation services to hundreds of millions of the world's poorest people. The most outstanding of these efforts is the launching in 1981 of the United Nations International Drinking Water Supply and Sanitation Decade (IDWSS) which resulted from the Mar del Plata Action Plan adopted by the United Nations Water Conference in 1977. The commonly agreed premise was that "all peoples, whatever their stage of development and their social and economic conditions, have the right to have access to drinking water in quantities and of a quality equal to their basic needs". The target of the IDWSS was to provide safe drinking water and sanitation to underserved urban and rural areas by 1990. But even the unprecedented progress achieved during this decade was not enough. One in three people in the developing world still lacks these two most basic requirements for health and dignity. It is also recognized that human excreta and sewage are the main causes of deterioration of water quality in developing countries, and the introduction of available technologies, including appropriate technologies, and the construction of sewage treatment facilities could bring significant improvement.

Objectives

38. The New Delhi Statement formalized the need to provide, on a sustainable basis, access to safe water in sufficient quantities and proper sanitation for all, requesting "some for all rather than more for some". Four Guiding Principles provide for the programme objectives:

a. protection of the environment and safeguarding of health through the integrated management of water resources and liquid and solid wastes;

b. institutional reforms promoting an integrated approach and including changes in procedures, attitudes and behaviour, and the full participation of women at all levels in sector institutions;

c. community management of services, backed by measures to strengthen local institutions in implementing and sustaining water and sanitation programmes;

d. sound financial practices, achieved through better management of existing assets, and widespread use of appropriate technologies.

39. Past experience has shown that specific targets should be set by each individual country. At the Summit for Children in September 1990, heads of state or government called for both universal access to water supply and sanitation and the eradication of guinea worm disease by 1995. Even for the more realistic target to achieve full coverage in water supply by 2025, it is estimated that annual investments must reach double current levels. One realistic strategy to meeting present and future needs, therefore, is to develop lower cost but adequate services that can be implemented and sustained at the community level.

Activities

40. [All countries, especially developing countries, according to their possibilities and with the assistance of appropriate United Nations agencies and other international organizations, and in cooperation with the industrialised countries could embark upon the following activities:]

a. the environment and health

- establishment of protected areas for sources of water supply
- sanitary disposal of excreta and sewage, using appropriate systems to treat wastewaters in urban and rural areas
- expansion of urban and rural water supply
- building and expansion, where appropriate, of sewage treatment facilities and drainage systems
- treatment and safe reuse of domestic and industrial wastewaters in urban and rural areas
- control of water-associated diseases

b. people and institutions

- [strengthening the functioning of governments in water resources management and, at the same time, giving full recognition to the role of local authorities]

  or:

- [encouraging decentralization and the part played by local authorities, private enterprises and NGOs]

  or:

- [drawing attention of governments to the need for greater decentralization and for strengthening the role of local authorities, private enterprises and NGOs]

- human resources development at all levels, including special programmes for women

- broad-based education programmes, with particular emphasis on hygiene, local management and risk reduction

- [international coordination mechanisms for programme funding and implementation]

c. national and community management

- support and assist communities in managing their own systems on a sustainable basis

- encouragement of [the local population, especially] women in water management

- linkages between national water plans and community management of local waters

- integration of community management of water in the context of overall planning

- promotion of primary health and environmental care at the local level, including training for local communities in appropriate water management techniques and primary health care

- assisting service agencies to be more cost-effective and responsive to consumer needs

- more attention to be given to underserved rural and low-income peri-urban areas

- rehabilitation of defective systems, reduction of wastage and safe reuse of water and wastewater [through additional international financing]

- [programmes for operation and maintenance on the basis of cost recovery and charging mechanisms]

  or:

- [programmes for rational water use and ensured maintenance]

- research and development of appropriate technical solutions

- [review of the criteria of financial assessment of drinking water and sanitation projects of multilateral credit organizations by taking into account mainly the environmental and social benefits of these projects]

- [international efforts of solidarity by the developed countries with the developing countries in granting new and additional financial resources in accordance with resolution 44/228 in order to install treatment plants for urban waste waters]

Means of Implementation

41. [The implementation by developing countries of specific programmes and actions envisaged under Agenda 21 will be subject to the provision of adequate new and additional financial resources and of technology on concessional, preferential and non-commercial terms.

Proposals for means of implementation will include the following headings:

- Financing and cost evaluation;

- Scientific and technological means;

- Human resources development;

- Building capacity of developing countries for preventive and corrective action in the field of environmental protection and promotion of development.]

E. WATER AND SUSTAINABLE URBAN DEVELOPMENT

Basis for action

42. Early in the next century, more than half of the world's population will be living in urban areas. By 2025 that proportion will have risen to 60 per cent, some 5 billion people. Rapid urban population growth and industrialization are putting severe strains on the water resources and environmental protection capabilities of many cities. Scarcity of freshwater resources and the escalating costs of developing new resources have a considerable impact on national industrial, agricultural and human settlement development and economic growth. Better management of urban water resources, including the elimination of unsustainable consumption patterns, can make a

substantial contribution to the alleviation of poverty and improvement of the health and quality of life of the urban and rural poor. This situation is particularly serious in developing countries. A high proportion of large urban agglomerations are located around estuaries and in coastal zones, leading to pollution from municipal and industrial discharges combined with overexploitation of available water resources and threatening the marine environment and the supply of freshwater resources.

Objectives

43. The development objective of this programme is to support local and central governments' efforts and capacities to sustain national development and productivity through environmentally sound management of water resources for urban use. Supporting this objective is the identification and implementation of strategies and actions to ensure the continued supply of affordable water for present and future needs, and to reverse current trends of resource degradation and depletion.

44. [Countries should strive to achieve by the year 2000:

a. All urban residents would have access to at least 40 litres per capita a day of safe water and 75 per cent are provided with on-site or community facilities for sanitation;

b. All countries would establish and apply quantitative and qualitative discharge standards for municipal and industrial effluents;

c. 75 per cent of solid waste generated in urban areas would be collected and recycled or disposed of in an environmentally safe way.]

Activities

45. [All countries, especially developing countries, according to their possibilities and through regional and international cooperation, and with the support of NGOs and the private sector, could undertake the following activities:]

a. protection of water resources from depletion, pollution and degradation

- introduction of sanitary waste disposal facilities based on ecologically sound low-cost and upgradable technologies;
- implementation of urban storm water run-off and drainage programmes;
- promotion of recycling and reuse of waste-water and solid wastes;
- control of industrial pollution sources to protect water resources;
- protection of watersheds from depletion and degradation of their forest cover and from harmful upstream activities;

- promotion of research into the contribution of forests to sustainable water resources development;

- limitation of the intensive use of agrochemicals with a view to minimizing their impact on water resources;

b. efficient and equitable allocation of water resources

- reconciliation of city development planning with the availability and sustainability of water resources;

- satisfaction of the basic water needs of the urban population;

- introduction of water tariffs, where affordable, which reflect the marginal and opportunity cost of water, especially for productive activities;

c. institutional/legal/management reforms

- adoption of a city-wide approach to the management of water resources;

- promotion at the national and local level of the elaboration of land use plans which give due consideration to water resources development;

- utilization of the skills and potential of non-governmental organizations and the private sector and local people, taking into account the public and strategic interests of water resources;

d. promotion of public participation

- initiation of public awareness campaigns to encourage the public towards rational water utilization;

- sensitization of the public for the protection of water quality within the urban environment;

- promotion of public participation for the collection, recycling and elimination of wastes;

e. support to local capacity building

- development of legislation and policies to promote investments in urban water and waste management reflecting the major contribution of cities to national economic development;

- provision of seed money and technical support to the local handling of materials supply and services;

- encouragement, to the extent possible, of autonomy and financial viability of city water, solid waste and sewerage utilities;

- creation and maintenance of a cadre of professionals and semi-professionals for water, waste water and solid waste management.

Means of Implementation

46. [The implementation by developing countries of specific programmes and actions envisaged under Agenda 21 will be subject to the provision of adequate new and additional financial resources and of technology on concessional, preferential and non-commercial terms.

Proposals for means of implementation will include the following headings:

- Financing and cost evaluation;
- Scientific and technological means;
- Human resources development;
- Building capacity of developing countries for preventive and corrective action in the field of environmental protection and promotion of development.]

F. WATER FOR SUSTAINABLE FOOD PRODUCTION AND RURAL DEVELOPMENT

Basis for action

47. Sustainability of food production increasingly depends on sound and efficient water use and conservation practices consisting primarily of irrigation development and management including water management in rainfed areas, livestock water supply, inland fisheries and agro-forestry. Rural development requires the integrated satisfaction of basic human needs for drinking water and for food production. While significant expansion of the area under rainfed agriculture has been achieved during the past decade, the productivity response and sustainability of irrigation systems have been constrained by problems of water-logging and salinization. Financial and market constraints are also a common problem. Soil erosion in the upstream watersheds, mismanagement and over-exploitation of the natural resources [in downstream watersheds] and acute competition for water, have all influenced the extent of poverty, hunger and famine in the developing nations. Soil erosion caused by overgrazing of livestock in uplands is also often responsible for the siltation of lakes. The development of irrigation schemes is most often not supported by environmental impact assessments identifying hydrological consequences within watersheds and due to interbasin transfers, nor by the assessment of social impacts on peoples in river valleys.

Objectives

48. An International Action Programme on Water and Sustainable Agricultural Development (IAP-WASAD) has been initiated by FAO in cooperation with other international organizations. The main objective of the IAP-WASAD is to assist developing countries in planning, developing and managing water resources on an integrated basis to meet the present and future needs for agricultural production, taking into account environmental considerations.

49. The IAP-WASAD has developed a framework for sustainable water use in the agricultural sector and identified priority areas for action at national, regional and global levels. Quantitative targets for new irrigation development, improvement of existing irrigation schemes and reclamation of waterlogged and salinized lands through drainage for 94 developing countries are estimated on the basis of food requirements, agro-climatic zones and availability of water and land.

50. [Freshwater fisheries in lakes and streams are an important source of food. Utilization of water resources for other purposes should minimize their impact on freshwater ecosystems and fish populations and on the people who depend on these ecosystems for food security. Objectives for livestock, inland fisheries and aquaculture to be inserted. References: PC/61 and PC/69.]

51. The projections for irrigation are as follows:

[By the year 2000:

a. 21 million hectares of new irrigation development;

b. 17 million hectares of improvement/modernization of existing schemes;

c. 10 million hectares installed with drainage and water control facilities;

d. 15 million hectares of small-scale irrigation water programmes and conservation.]

52. The development of new irrigation areas at the above level may give rise to environmental concerns as this may imply the destruction of wetlands, water pollution, increased sedimentation and a reduction in biodiversity. Therefore, new irrigation schemes should be accompanied by an environmental impact assessment in case considerable negative environmental impacts are expected and also depending upon the scale of the scheme. Before developing new irrigation schemes, efforts should be made towards a more rational exploitation of existing schemes, including increased efficiency and productivity. Technologies for new irrigation schemes should be thoroughly evaluated, including their potential conflicts with other land uses. The active involvement of water users groups is a supporting objective.

53. [Quantitative targets for livestock, inland fisheries and aquaculture to be inserted. References: PC/61 and PC/69.]

Activities

54. [Countries, especially developing countries, according to their possibilities and with the support of the international community and cooperation of the private sector and NGOs, could undertake the following activities to protect their water resources from depletion and degradation:]

a. water use efficiency

- increase of efficiency and productivity in agricultural water use for better utilization of limited water resources;

- strengthening of water and soil maragement research under irrigation and rainfed conditions;

- monitoring and evaluation of irrigation project performance to ensure, inter alia, the optimal utilization and proper maintenance of the project;

- support to water users groups with the aim to improve management performance at the local level;

- supporting the appropriate use of relatively brackish water for irrigation;

b. waterlogging, salinity control and drainage

- introduction of surface drainage in rainfed agriculture to prevent temporary waterlogging and flooding of lowlands;

- introduction of artificial drainage in irrigated and rainfed agriculture;

- encouragement of conjunctive use of surface and groundwaters, including monitoring and water balance studies;

- practising of drainage in irrigated areas of arid and semi-arid regions;

c. water quality management

- establishment and operation of cost-effective water quality monitoring systems for agricultural water uses;

- prevention of adverse effects of agricultural activities on water quality for other social and economic activities and on wetlands, inter alia, through optimal use of on-farm inputs and the minimization of the use of external inputs in agricultural activities;

- establishment of biological, physical and chemical water quality criteria for agricultural water users and for marine and riverine ecosystems;

- prevention of soil run-off and sedimentation;

- proper disposal of sewage from human settlements and of manure produced by intensive livestock breeding;

- minimize adverse effects from agricultural chemicals by use of integrated pest management;

- education of communities about the pollution impacts of the use of fertilizers and chemicals on water quality and food safety;

d. small-scale water programmes

- development of small-scale irrigation, water supply for humans and livestock and for water and soil conservation;

- promotion of local initiatives for the integrated development and management of water resources;

- provision of adequate technical advice and support and enhancement of institutional collaboration at the local community level;

- [promotion of a technical farming approach for water management which takes account of the level of education, the capacity to mobilize local communities, and the ecosystem requirements of arid and semi-arid regions];

e. scarce water resources management

- development of long-term strategies and practical implementation programmes for agricultural water use under scarcity conditions with competing demands for water;

- recognition of water as an economic and strategic good in irrigation planning and management;

- formulation of specialized programmes focused on drought preparedness with emphasis on food scarcity and environmental safeguards;

- promotion and enhancement of waste water reuse in agriculture;

- [encouragement of basin-wide cooperation in the integrated development of all types of transboundary water resources, taking into consideration the sovereignty of States and the equitable use of water resources];

f. [supporting capacity building

- development of adequate databases and adaptive research;

- institutional strengthening based upon human resources development at all levels, in particular water users groups, with special attention to rural women and small-scale farmers;

- transfer of existing water use technologies and support of their field application.]

[Note: Activities concerning livestock, inland fisheries and aquaculture to be added. References: PC/61 and PC/69.]

Means of implementation

55. [The implementation by developing countries of specific programmes and actions envisaged under Agenda 21 will be subject to the provision of adequate new and additional financial resources and of technology on concessional, preferential and non-commercial terms.

Proposals for means of implementation will include the following headings:

- Financing and cost evaluation;

- Scientific and technological means;

- Human resources development;

- Building capacity of developing countries for preventive and corrective action in the field of environmental protection and promotion of development.]

[G. IMPACTS OF CLIMATE CHANGE ON WATER RESOURCES

Basis for action:

56. There are many uncertainties about climate change and particularly sea-level rise. Global climate changes could have disastrous effects on freshwater resources and their availability and, through sea-level rise, threaten coastal aquifers and small-island ecosystems. This is particularly crucial to small-island countries which rely for their freshwater supply almost exclusively upon underground water resources. Already, many small low-lying and island countries have to cope with the effects of variations in the hydrological regime on coastal and marine resources. The intrusion of salt water into coastal aquifers and flooding from tidal increases is a reality in many of these countries. While there is no definitive proven link between these phenomena and climate change, there is none the less cause for concern that these trends may escalate. Consequently, there is a due need for response strategies that are based on sound scientific data.

57. A long-term research commitment, based on shared responsibilities of countries concerned, is needed to reduce the uncertainties involved. Meanwhile, precautionary measures have to be initiated to diminish present risks and effects, particularly on small islands, low-lying States and coastal areas of the world. The work of the IPCC in this field is to be taken into account.

Objectives

58. To develop techniques and methodologies for assessing the potential adverse effects of sea-level rise, as a consequence of climate change, on freshwater resources and the resulting social, economic and environmental impacts.

Activities

59. Countries, especially developing countries, according to their possibilities and with the assistance of the international community, could undertake the following:

a. development of methods and approaches for the assessment and monitoring of the effects of climate change on coastal aquifers and freshwater resources;

b. assessment of the social, economic and environmental impacts of coastal dynamics and their implication for freshwater resources;

c. development of possible response measures, proactive and reactive, based on the above assessments;

d. continuous assessment of the impact of climate change on hydrological systems worldwide;

e. mitigation of saline intrusion into aquifers of small islands and coastal plains as a consequence of sea-level rise.

Means of implementation

60. The implementation by developing countries of specific programmes and actions envisaged under Agenda 21 will be subject to the provision of adequate new and additional financial resources and of technology on concessional, preferential and non-commercial terms.

Proposals for means of implementation will include the following headings:

- Financing and cost evaluation;

- Scientific and technological means;

- Human resources development;

- Building capacity of developing countries for preventive and corrective action in the field of environmental protection and promotion of development.]